



Vitas Saldžiūnas*

VIP Security Department
Within the Ministry of the Interior
Vilnius
LITHUANIA

Aleksandras Kovalenko**

Police Department
Under the Ministry of the Interior
Vilnius
LITHUANIA

Field and Laboratory Polygraph Examinations

Since the polygraph was used in criminal investigations for the first time, questions have constantly been asked as to how reliable the obtained results are, and to what extent they can be repeated by other polygraphologists after a certain period of time. These questions are raised mainly by the opponents of the forensic psychophysiology method as well as lawyers and judges.

We will start the discussion with Krzyścin's (1998) ideas about the techniques of the CIT (concealed information test) type, which will be the focus of our attention. Scientific research carried out after 1985 did not bring confirmation

* vitas.saldziunas@vad.lt

** aleksandr.kovalenko@policija.lt

of the previous enthusiastic opinions about the high accuracy and reliability of this examination technique. It turned out that both in tests conducted as laboratory experiments and in real criminal cases there is never a 100% certainty that the result will comply with reality. In criminal events several different factors may affect the precision of diagnosis.

Over a decade has passed. Today, written sources state (Gamer, 2010) that tests of the CIT type are widely used not only in laboratory research but also in field examinations, mainly in Japan. This view is shared by other authors as well (Suzuki et al., 2004; Carmel et al., 2003; Podlesny, 2003; Iacono, 2008b). This means that scientific and field researchers (polygraphologists) communicate little, i.e. the exchange of information is poor.

To begin with, an entire group of CIT type tests with certain modifications is available today:

- GKT – guilty knowledge test (Abrams, 1989)
- CKT – concealed knowledge test (Seymour et al., 2007, 2009)
- POT – peak of tension test (Abrams, 1989)
- MCT – multiple choice test (Krzyścin, 1998)
- SPOT – searching peak of tension (Nakayama, 2002)
- GAT – guilty actions test (Bradley et al., 1992, Gamer, 2010a, b)
- POT-A – known solution POT (Konieczny, 2009)
- POT-B – searching POT (Konieczny, 2009)
- GCIT – group CIT (Bradley et al., 2010)
- EKT¹ – event knowledge test (Saldžiūnas et al., 2008a, b, c, 2009a)

Thus, are tests of the CIT type used only in Japan? We tried to close this gap at least in part by making use of our personal contacts, and present the collected information in Table 1.

We have already gained considerable experience by investigating complicated criminal offences under field conditions. We are also interested in what is examined by scientists in laboratories. Most laboratory studies are concluded for the purpose of generalising the field (Pollina et al., 2004). Important sources of variability in field studies include the format of the test questions used during the polygraph examination, the personalities of the examinee and examiner, polygraph measures used, and the rules used to render a deception indicated or no deception indicated decision. We will look briefly at the opinions of various authors comparing the results obtained in the laboratory and under field

conditions. All universities (in the USA, Canada, Germany, Holland, Belgium, Finland, Israel, Japan, Scotland) where experiments were conducted prove that tests of the CIT type have a scientific basis and can be used to identify concealed information.

Table 1

Percentage of CIT in field examinations performed by organisations conducting criminal investigations.

Country	Organisation	$\frac{n(CIT)}{n(CIT) + n(CQT)} \times 100, \%$	Information source
Armenia	Ministry of National Security	60–70	Apojan et al. 2000
Bulgaria	police	0	Nikolova et al. 2000
Belarus	militia	90–100	personal contacts
Estonia	police	0	personal contacts
Japan	police	90	Nakayama 2006
Kazakhstan	police	95–99	personal contacts
Latvia	police	0	Mikelsons 2000
Lithuania	police	100	authors
Poland	police	60	personal contacts
Russia	militia	45–55	personal contacts
Serbia	police	90	personal contacts
USA	FBI	13–18	Podlesny 1994

n(CIT) – number of field examinations performed by using tests of CIT type

n(CQT) – number of field examinations performed by using tests of comparison question test type

M. Nakayama (2002) notes that CIT in the field differs from a memory test in a laboratory experiment.

According to E. Elaad (2003), the main problem with a mock crime situation is that the control questions are real questions, whereas the relevant questions correspond to the mock crime, which is likely to be less threatening than a real crime.

However, according to W. Iacono (2008), in real life it is much more difficult to determine who is in fact guilty or innocent.

R. Suzuki et al. (2004) say that the CIT, especially in the field rather than the laboratory, may also operate through more emotional psychological mechanisms. The danger of generalising from the laboratory to the field is especially great in the case of the psychophysiological detection of guilt.

It is highly likely that the difference between the two situations is not just a matter of degree of attention paid to the questions, but rather a difference in the quality of the emotions involved. Breath-holding (respiratory apnea) is quite rare in laboratory experiments; it occurs quite frequently in field CITs.

According to B. Vershuere et al. (2005 b), our results further demonstrate that antisocial inmates (applicable to women as well) reduced electrodermal responding to concealed information. The electrodermal hyperresponsiveness in antisocial individuals might therefore threaten the validity of the concealed information.

According to J. Furedy (1991), our manipulation of motivation had no main or interactive effects on differential responsibility to the questions (laboratory studies).

According to G. Ben-Shakhar (2002), nonetheless, evidence from laboratory studies must be supplemented by evidence from field studies, because real interrogations differ from simulated GKT experiments in important ways. (1) Simulated GKT experiments have used very simple tasks in which it was ascertained that all subjects learned all the relevant items, and memory for these details was not a concern, because subjects were typically tested immediately after being exposed to the guilty information. In real life, the offender is faced with a complex scene, and may not in fact notice, process, or store all details in his memory. Moreover, because suspects are rarely tested immediately after committing the criminal act, and sometimes only months later, the forgotten details may lose their signal value. (2) The main thing that could jeopardise a GKT test – leakage – was missing in the simulated studies. In real interrogations, critical items may be leaked to innocent suspects, raising false-positive errors – especially if informed innocent suspects are unable to explain how they became aware of the guilty information. See more on this issue below. (3) Though mock-crime experiments give subjects motivation to “pass,” suspects in a real crime are obviously more motivated to use countermeasures.

According to Ben-Shakhar et al. (2003), our meta analysis is limited to experimental studies. The results indicate that the electrodermal measure can

provide an efficient means for detecting relevant information and for differentiating between individuals with guilty knowledge and those who do not have that knowledge.

According to Fiedler et al. (2002), situated somewhere between everyday lying and lying during a real life criminal investigation, laboratory studies on the CQT have their own unique features. We have largely excluded these studies from this consideration because such laboratory studies are qualitatively different from, and hardly comparable to, real-world courtroom procedures. A participant in a mock crime study or temptation study, who is deliberately requested to lie about a predetermined subject, does not experience any moral or affective conflict about lying, because nobody is (or stays) deceived. Lying in a psychological experiment is socially acceptable, the subject does not have to fear the trait label "dishonest." Deception becomes a playful task and a credible lie becomes an achievement not accompanied by shame. Most importantly, the respondent does not have to fear any serious consequences of being caught while lying. Providing positive incentives for successful lying does not represent a substitute for the extreme negative motivation that characterises forensic lie detection in reality.

According to Carmel et al. (2003) (1), in mock-crime studies, it is typically guaranteed that the guilty participants take notice of all the relevant details and remember them when they take the GKT. This is achieved through instructions that specify all these details precisely. Furthermore, in realistic conditions participants were told that they could stay in the office for a limited time (five minutes), after which the room's occupant, a teaching assistant, would return to his office and catch them. In addition, participants in the realistic conditions were not reminded of the relevant details before the GKT (2). Whereas in the standard mock-crime paradigm the GKT is administered immediately after the mock crime, in a realistic setting it is usually administered after a long period.

According to Gamer et al. (2010a), in laboratory studies relying on the mock crime paradigm, it was typically guaranteed that participants took notice of all relevant details and it was assured that they remembered them in the subsequent GKT examination.

M.C. Cullen and M.T. Bradley (2004) are right: laboratory studies do not approach the emotional and tension levels associated with the field situation.

We can see that the question of what the difference is between laboratory and field polygraph examinations is important for both scientists and field specialists. We as practitioners are greatly surprised by the statements emerging about realistic mock crimes (Jokinen et al., 2006). Without seeking to prove that we are absolutely right and to be comprehensive, we offer our thoughts for a discussion.

~ 1. We reviewed the major part of laboratory examinations and prepared Table 2.

Table 2.

Mock crimes participants of laboratory examinations.

authors	participants	age/mean age
Patrick (1991)	prison inmates	25.90
Furedy (1991)	undergraduate students	–
Ben-Shakhar (1999)	undergraduate students	–
Ben-Shakhar (2000)	undergraduate students	22.17
Ben-Shakhar (2002)	undergraduate students	22.3
Elaad (2003)	interrogators	30.5
Carmel (2003)	undergraduate students	23.3
Verschuere (2005a)	students	18.22
Verschuere (2005b)	students	18.63
	male prisoners	39
Gronau (2005)	undergraduate students	–
Elaad (2006)	college students & staff	26.7
Meijer (2007)	undergraduate students	21–33
Verschuere (2007)	undergraduate students	18–20/18–30
Seymour (2009)	undergraduate students	–
Elaad (2009a)	college students	22.9
Elaad (2009b)	undergraduate students	23.06
Gamer (2010a)	students (80%)	26.2
Gamer (2010b)	students (89%)	24.2

Students, i.e. individuals with a fairly good education and quite intellectual, having almost no health disorders, almost no drug addicts among them, their average age is around 22, generally take part in laboratory examinations. The subjects in this category of examination have a labile nervous system and rapid response of answers (short latent time). Individuals in this category are known

to usually exhibit clear GSR responses (Soshnikov et al., 2008). Verschuere et al (2005b, 2006) pointed out that antisocial inmates display reduced electrodermal responding to concealed information. We think that this observation is just right. During field measurements, we do not have the possibility to impartially assess the examinee's level of sociability. We only noticed that individuals with lower intellect, blue-collar workers, and alcohol abusers may display much weaker GSR responses or electrodermal responding may be completely uninformative.

~ 2. During field examinations, after the options for answers provided by the examiner (in the case of EKT), subjects do not always use words YES and NO in their answers. They unintentionally, and sometimes intentionally, answer: I don't remember, I don't know, I don't know this person, I didn't do it. Sometimes there is a pause prior to the answer as the examinee starts thinking (is looking for the right answer). This is applicable only to EKT, where the subjects being examined are not told the options of answers in advance. Sometimes the subject asks to repeat the question or makes a comment on the answer. Due to this psychophysiological response records become more complicated, with a lot of artefacts.

~ 3. After hearing the options of answers, the examinee sometimes comes up with an answer unusually quickly (EKT). If this is a consistent pattern after critical or key answers (knowingly related to the event), it is likely that he wants to deceive in a primitive way that he is telling the truth.

~ 4. The examinee may face very serious consequences after the conclusions of field examinations: suspicions against him may be proved or not. Although during laboratory examinations subjects are motivated or encouraged, their psychological state is not as tense as in the event of a real criminal act. The results of a study by Pollina et al. (2004) suggest that there are significant differences between field and similarly obtained laboratory psychophysiological detection of deception response measures. In the lab, the emotion is likely to be fascination with the process and the desire to "win the game". Furthermore, in real-life tests, guilty suspects might experience fear and, with the increasing threat, the physiological activation to crime relevant information might shift from orienting to defensive responses, which prepare the individual to fight and flight (Verschuere et al., 2004). We noticed that in real examinations a guilty suspect (which becomes clear in court) may experience very strong emotions due to which psychophysiological response records become very complicated and difficult to decipher.

We noticed that even innocent individuals (unrelated to the criminal act) worry a lot at the beginning of the examination. Therefore, at the beginning of the EKT test we ask introductory questions which are unrelated to the criminal event being investigated and after which innocent examinees calm down (Saldžiūnas et al., 2008a, b, c).

~ 5. During field examinations, individuals who committed the criminal act being investigated sometimes use counteractions in order to mislead the polygraphologist (Varlamov et al., 2000). Thus far, we have not had a case where an examinee who did not commit a criminal act impeded the investigation.

~ 6. An experienced qualified polygraphologist makes a reasonable conclusion not only on the basis of individual responses recorded by sensors. He makes a comprehensive analysis of the examinee's non-verbal responses, the general development of psychophysiological responses during the entire examination (Saldžiūnas et al., 2008c), the acoustic timbre of the examinee's answers, latent time of answers, and the examinee's tactics of cooperation. Laboratory polygraph examinations are rather poor in this respect.

~ 7. Subjects in field examination may be drug addicts, individuals using psychotropic medications in large doses, people with impaired hearing, or with disturbed response to external stimuli. The records of aforementioned subjects are also more difficult to decipher.

~ 8. Not everything that is going on during a real criminal act is noticed and memorised by a witness or participant in a criminal act (Saldžiūnas et al., 2009d). The polygraphologist does not know what the examinee remembers; therefore, he can formulate questions and answers to which no symptomatic (significant) responses are recorded.

~ 9. Interference of serial offenses on memory. The repetitive character of offenses, such as theft or burglary, may present difficulties for the examinee to recall details about each crime incident precisely (Nakayama, 2002; Carmel et al., 2003).

~ 10. In laboratory examination, the polygraphologist knows exactly the story of a criminal act. In field examination, the polygraphologist often has to look for the details of a criminal act; therefore, questions and answers formulated during the examination are not precise and may "miss the point".

~ 11. Several laboratory works are aimed at identifying how leakage of relevant information influences innocent examinees in the GKT (Ben-Shakhar et al., 1999; Elaad, 2009b). Yet, it is most unlikely that in laboratories it is possible to check how the results of a psychophysiological polygraph examination are affected by the fact that the perpetrator (this fact is unknown during the psychophysiological examination) explains that he found out one or several details about the criminal act from the interrogator or the media. Thus far, it has been recommended to exclude such questions from tests of the CIT type (Abrams, 1989; Iacono, 2008b; Konieczny, 2009; Nakayama, 2002). Our colleague from Belarus V. Kniazev and we are collecting material from field examinations and hope to discuss this issue after some time.

~ 12. A field examiner usually works under conditions which are far from ideal:

- time – by law, detained suspects are entitled to timely meals and rest
- working conditions – due to material or other tactical circumstances it is impossible to ensure ideal compliance with the requirements imposed on the premises where the examination is carried out and its equipment (Konieczny, 2009)
- lawyers – suspects have the right to legal defence and their lawyers may interfere with a smooth polygraph examination
- medicine – it is impossible to ensure that the individuals being examined have not taken any medication.

~ 13. Nakayama (2002) concluded that the decreased respiration rate during the critical question depended on the expiration period. It was confirmed that expiration period is the most effective index of deception (unopenness) in a field situation. In laboratory examinations, however, Gamer et al. (2010a) did not find significant group differences in the respiration pattern between guilty examinees and informed innocent.

~ 14. An assumption was made (Lewandowski et al., 2008) that polygraphic research is based on revealing mental and emotional traces, independent of the fact whether the person examined tells the truth or is trying to conceal or distort the truth, it is possible to define what actual mental trace is recorded in the person's nervous system during an examination. In our view this assumption is worth serious discussion and verification in field examinations.

~ 15. In field polygraph examinations, due to a high emotional tension felt by the "guilty" examinee, the questions may be divided into emotionally strong and

weak questions. It is obvious that this grouping is subjective, i.e. understood from the polygraphologist's position. When combining strong and weak questions, the polygraphologist may develop the tactics of examination (Saldžiūnas et al., 2008 c). When examining the "innocent" examinee by polygraph, in our view, the tactics of sequencing questions are not important.

~ 16. In field examinations, the examinee is usually more focused on the problem of the examination being performed and potential consequences; therefore, he is less responsive to insignificant external stimuli of the surroundings (low noise, certain movement, etc.). On the other hand, the examinee is very sensitive to each motion or word of the polygraphologist (Saldžiūnas et al., 2009b).

Conclusions

- The use of the polygraph is a scientifically-based application of psychophysiology.
- Although significant differences between field and similarly obtained laboratory polygraph data have been found, laboratory studies using mock-crime scenarios can provide useful information about the field polygraph situation (Pollina et al., 2004). The cost to a particular lab of implementing a new measure is important for progress in the field (Furedy, 2009).
- Only some CIT test options may be modelled in laboratory examinations.
- Most probably scientists should take interest in the tactics employed by field examiners.
- Nonetheless, some generalisations are possible to make only from field works.

¹ EKT is the most universal test of the ones mentioned here. It encompasses the tactics of all CIT type tests. An entire series of special tactics has been developed for the EKT test which greatly extends its possibilities. When performing EKT in cooperation with criminal investigators of the police in Lithuania, the suspect's role in the event can be identified, i.e. whether the individual is a) completely unrelated to the event, b) a witness to the event, c) an accomplice, d) a perpetrator. In the event of several perpetrators, their roles in the criminal act can be identified, i.e. the contribution of each perpetrator to the criminal act. When performing EKT, the instruments of the criminal act, the mode of the criminal act, the technique and the place can be identified, and the instruments of the criminal act and victims' bodies can be found. We are further enhancing EKT tactics. As soon as they are tested in field (practical) examinations, we will provide them in our later articles for your comments.

Acknowledgements

The authors thank Mike T. Bradley and Bruno Verschuere for their constructive comments and support.

References

Abrams S. (1989) *The Complete Polygraph Handbook*. Toronto: Lexington Books.

Arojan R., Grigorian G. & Minasian J. (2000), *Опыт применения полиграфных тестирований в МНБ Республики Армении*, in *Теория и практика применения полиграфа в правоохранительной деятельности*, Soshi, 10–16 [text in Russian].

Ben-Shakhar, G., Gronau, N., & Elaad, E. (1999), *Leakage of relevant information to innocent examinees in the GKT: An attempt to reduce false-positive outcomes by introducing target stimuli*. *Journal of Applied Psychology*, 84, 651–660.

Ben-Shakhar, G., Gati I, Ben-Bassat, N. & Sniper, G. (2000), *Orienting response reinstatement and dishabituation: The effects of substituting, adding and deleting components of nonsignificant stimuli*, *Psychophysiology*, 37, 102–110.

Ben-Shakhar, G., Bar-Hillel, M., & Kremnitzer, M. (2002a). *Trial by polygraph: Reconsidering the use of the GKT in court*. *Law and Human Behavior*, 26, 527–541.

Ben-Shakhar G. & Elaad E. (2002b), *Effects of questions repetition and variation on the efficiency of the guilty knowledge test: A reexamination*, *Journal of applied psychology*, 87, 972–977.

Ben-Shakhar G. & Elaad E. (2003), *The validity of psychophysiological detection of information with the guilty knowledge test: A meta-analytic review*, *Journal of applied psychology*, 88, 131–151.

Bradley M. T. & Rettinger J. (1992), *Awareness of crime relevant information and the guilty knowledge test*, *Journal of Applied Psychology*, 77, 1, 55–59.

Bradley M. T. & Barefoot (2010), *Eliciting information from groups: Social information and the concealed information test*, Canadian Journal of Behavioural Science, 42, 2, 109–115.

Carmel D., Dayan E., Naveh A., Raveh O. & Ben-Shakhar G. (2003), *Estimating the validity of the guilty knowledge test from simulated experiments: the external validity of mock crime studies*, Journal of Experimental Psychology: Applied, 9(4), 261–269.

Carmel D., Dayan E., Naveh A., Raveh O., & Ben-Shakhar G. (2003), *Estimating the validity of the guilty knowledge test from simulated experiments: the external validity of mock crime studies*, Journal of Experimental Psychology: Applied, 9, 261–269.

Cullen M.C. & Bradley M.T. (2004), *Positions of truthfully answered controls on control question test with the polygraph*, Canadian Journal of Behavioural Science, 36(3), 167–176.

Elaad E. (2003), *Is the inference rule of the “control question polygraph technique” plausible?*, Psychology, Crime & Law, Vol. 9, 37–47.

Elaad E. & Ben-Shakhar G. (2006), *Finger pulse waveform length in the detection of concealed information*, International Journal of Psychophysiology, 61, 226–234.

Elaad E. & Ben-Shakhar G. (2009a), *Countering countermeasures in the concealed information test using cover respiration measures*, Applied Psychology and Biofeedback, 34(3), 197–208.

Elaad E. (2009b), *Effects of context and state of guilt on the detection of concealed crime information*, International Journal of Psychophysiology, 71, 225–234.

Fiedler K., Schmid J. & Stahl T. (2002), *What is the current truth about polygraph lie detection?*, Basic and applied social psychology, 24(4), 313–324.

Furedy J. & Ben-Shakhar G. (1991), *The role of deception, intention to deceive, and motivation to avoid detection in the psychophysiological detection of guilty knowledge*, Psychophysiology, 28, 2, 163–171.

Furedy, J (2009), The concealed information test as an instrument of applied differential psychophysiology: Methodical considerations, *Applied Psychology and Biofeedback*, 34(3), 149–160.

Gamer M., Kosiol D. & Vossel G. (2010a), *Strength of memory encoding affects physiological responses in the Guilty Actions Test*, *Biological Psychology*, 83(2), 101–107.

Gamer M. (2010b), *Does the Guilty Actions Test allow for differentiating guilty participants from informed innocents? A re-examination*, *International Journal of Psychophysiology* (article in press).

Gronau N., Ben-Shakhar G. and Cohen A. (2005), *Behavioral and physiological measures in the detection of concealed information*, *Journal of Applied Psychology*, 9 (1), 147–158.

Honts, C., & Schweinle, W. (2009), *Information gain of psychophysiological detection of deception in forensic and screening settings*, *Applied Psychology and Biofeedback*, 34(3), 161–172.

Iacono W. (2008a), *Accuracy of polygraph techniques using confessions to determine ground truth*, *Physiology & Behavior*, 95, 24–26.

Iacono W. (2008b), *Effective policing. Understanding how polygraph tests work and are used*, *Criminal Justice and Behavior*, 35(10), 1295–1208.

Jokinen A., Santtila P., Ravaja N. & Puttonen S. (2006), *Salience of guilty knowledge test items affects accuracy in realistic mock crimes*, *International Journal of Psychology*, 62(1), 175–184.

Konieczny J. (2009), *Badania poligraficzne*, Warszawa, Wydawnictwa akademickie i profesjonalne [text in Polish].

Krapohl D. (2006), *Validated polygraph techniques*, *Polygraph*, 35(3), 149–155.

Krzyścin A. (1998), *Indirect methods in psychophysiological polygraphic examinations*, *Problemy kryminalistyki*, 222, 11–23.

Lewandowski E. & Lewandowski L. (2008) *Alibi testing potential in polygraphic examination*, European Polygraph, 3(1), 31–47.

MacLaren V. (2001), *A quantitative review of the guilty knowledge test*, Journal of Applied Psychology, 86(4), 674–483.

Meijer E., Smulders F., Johnston J. & Merchelbach H. (2007), *Combining skin conductance and forced choice in the detection of concealed information*, Psychophysiology, 44, 814–822.

Mikelsons U. (2000), *Использование полиграфа в Латвии*, in Теория и практика применения полиграфа в правоохранительной деятельности, Soshi, 146–153 [text in Russian].

Nakayama M. (2002), *Practical use of the concealed information test for criminal investigation in Japan*. Handbook of polygraph testing. London: Academic Press.

Nakayama M. (2006), *Changes of Respiration during the Critical Item in Field GKT Situation*. European Expert Meeting on Polygraph Testing, Maastricht, The Netherlands.

Nikolova D. & Zanev S. (2000), *Использование полифизиографической проверки в профессиональной психодиагностике*, in Теория и практика применения полиграфа в правоохранительной деятельности, Soshi, 189–197 [text in Russian].

Patrick Ch. & Iacono W. (1991), *A comparison of field and laboratory polygraphs in the detection of deception*, Psychophysiology, 28, 6, 632–638.

Podlesny J. A. (1994) *Is the guilty knowledge polygraph technique applicable in criminal investigations? A review of FBI case records*. Polygraph 23(1), 85–94.

Podlesny J. A. (2003), *A paucity of operable case facts restricts applicability of the guilty knowledge technique in FBI criminal polygraph examination*, Forensic science communication, 5(3).

Pollina D., Dollins A., Senter S., Krapohl D., & Ryan A. (2004), *Comparison of polygraph data obtained from individuals involved in mock crimes and actual criminal investigations*, Journal of Applied Psychology, 89(6), 1099–1105.

Saldžiūnas V. and Kovalenko A. (2008a), *The event knowledge test*, European Polygraph, 1(3), 21–29.

Saldžiūnas V. and Kovalenko A. (2008b), *The event knowledge test (EKT) in Polygraph Examination (in case murder)*, European Polygraph, 2(4), 137–142.

Saldžiūnas V. and Kovalenko A. (2008c), *The event knowledge test (EKT) in Polygraph Examination (common notice of tactics)*, European Polygraph, 3-4, 209–220.

Saldžiūnas V. and Kovalenko A. (2009a), *Problems of questions in event knowledge test*, European Polygraph, 3(2), 69–75.

Saldžiūnas V. (2009b), *EKT lub test wiedzy o zdarzeniu*, In *Wykorzystanie war-iografu (poligrafu) w badaniach kryminalistycznych oraz kadrowych* (21-23), Wydawnictwo Wyższej Szkoły Policji w Szczytnie [text in Polish].

Saldžiūnas V., Kovalenko A. and Soshnikov A. (2009c), *Probability assessment of the value of psychophysiological stimuli*, European Polygraph, 1(7), 25–31.

Saldžiūnas V., Kovalenko A., Gaidarov K. (2009d), *The problems of truth perception during psychophysiological examination*, European Polygraph, 3-4, 145–152.

Seymour T. & Kerlin J. (2007), *Successful detection of verbal and visual concealed knowledge using an RT-based paradigm*, Applied Cognitive Psychology, 22(4), 475–490.

Seymour T. & Fraynt B. (2009), *Time and encoding effects in the concealed knowledge test*, Applied Psychology and Biofeedback, 34, 177–187.

Soshnikov A. & et al. (2008), *Полиграф в практике расследования преступлений*, Moscow [text in Russian].

Suzuki R., Nakayama M. & Furedy J. J. (2004), *Specific and reactive sensitivities of skin resistance and respiratory apnea in a Japanese concealed information test (CIT) of criminal guilt*, Canadian Journal of Behavioral Science, Vol. 36(3), 202–209.

Varlamov V. A. and Varlamov G. V. (2007) Protivodejstvija poligrafu i puti ich nejtralizacii (Counteractions to polygraph testing and ways to neutralise them). Krasnodar: Kartika. [text in Russian].

Verschuere B., Crombez G., De Clercq A. & Koster E. (2004), *Autonomic and behavioural responding to concealed information: differentiating orienting and defensive responses*, *Psychophysiology*, 41, 461–466.

Verschuere B., Crombez G., De Clercq A. & Koster E. (2005a), *Psychopathic traits and autonomic responding to concealed information in a prison sample*, *Psychophysiology*, Mar. 42(2), 239–245.

Verschuere B., Crombez G., Koster E., & Van Baelen P. (2005b), *Behavioural responding to concealed information: examining the role of relevance orienting*, *Psychologica Belgica*, 45(3), 207–216.

Verschuere B., Crombez G., Koster E., Uzieblo K. (2006), *Psychopathy and psychological detection of concealed information: Review*, *Psychologica Belgica*, 46(1/2), 99–116.

Verschuere B. & Crombez G. (2008), *Déjà vu! The effect of previewing test items on the validity of concealed information polygraph test*, *Psychology, Crime & Law*, 14(4), 287–297.